12 Carrying Your Skills Forward

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You have already learned an extensive set of study skills and strategies from Chapters 1–11. This chapter provides you with new strategies for carrying those skills forward into the next term. Reading in content areas, understanding Bloom's Taxonomy, and familiarizing yourself with critical thinking skills will benefit you as you progress through your course requirements and enroll in higher level required courses. This chapter ends with culminating activities to prepare you for your final exam in this course and the upcoming term.

LEARNING OBJECTIVES

1. *Discuss strategies to use when reading college textbooks for different disciplines and content areas.*
2. *Explain the six levels of cognitive processing in the original and the revised Bloom's Taxonomy.*
3. *Define the term "critical thinking" and discuss characteristics of critical thinkers and the steps in the Scientific Method of Inquiry.*
4. *Complete the Culminating Activities for Essential Study Skills.*

CHAPTER OUTLINE

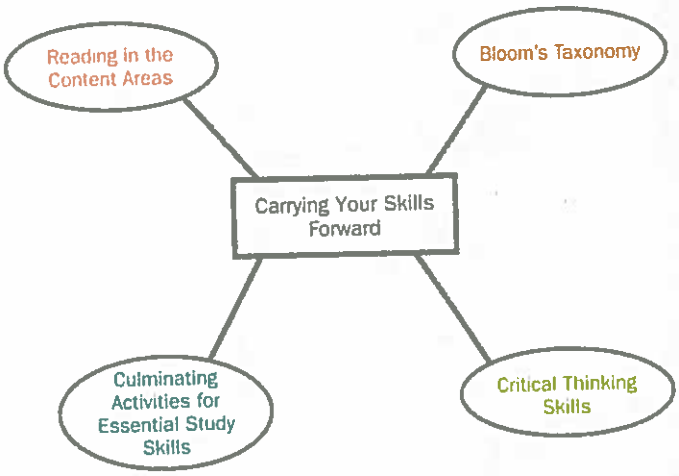
1. **READING IN THE CONTENT AREAS**
   - *Composition Textbooks*
   - *Literature Textbooks*
   - *Social Science Textbooks*
   - *Science Textbooks*
   - *Math Textbooks*
2. **BLOOM'S TAXONOMY**
   - *The Original Bloom's Taxonomy*
   - *The Revised Bloom's Taxonomy*
   - *Bloom's Taxonomy and You*
3. **CRITICAL THINKING SKILLS**
   - *Critical Thinkers*
   - *The Scientific Method of Inquiry*
4. **CULMINATING ACTIVITIES FOR ESSENTIAL STUDY SKILLS**
   - *Planning to Carry Skills Forward*
   - *Preparing for Your Final Exam*

Access Chapter 12 Expanded Chapter Outline and Objectives in your College Success CourseMate, accessed through CengageBrain.com.

YOUR CHAPTER MAPPING

After reading information under each heading, return to the chapter visual mapping below. Add key words to show subheadings and important details related to each heading.

Access Chapter 12 Visual Mapping in your College Success CourseMate, accessed through CengageBrain.com.



CHAPTER 12 PROFILE

Carrying Your Skills Forward

ANSWER, SCORE, and **RECORD** your profile before you read this chapter. If you need to review the process, refer to the complete directions given in the profile for Chapter 1 on page 4.

ONLINE: You can complete the profile and get your score online at this textbook's CourseMate Web site.

Access Chapter 12 Profile in your College Success CourseMate, accessed through *CengageBrain.com*.

	YES	NO
1. I am familiar with basic differences among composition, literature, social science, science, and math textbooks.	_____	_____
2. I use the 2:1 ratio for reading and studying for all of my courses.	_____	_____
3. I use the same study strategies for factual and process knowledge in my courses.	_____	_____
4. I understand different levels of thinking that are involved in course materials and test questions.	_____	_____
5. I use my study time to focus only on learning information that I need to remember and understand.	_____	_____
6. I take time when I study to break information into smaller parts (analyze) and also put details together to form a "big picture" (synthesize).	_____	_____
7. I accept textbook information as it is presented without questioning or evaluating its accuracy or usefulness.	_____	_____
8. I am open-minded and willing to adjust my opinions or decisions after evaluating data or relevant information.	_____	_____
9. I select appropriate strategies to review course material for this textbook and prepare for the final exam.	_____	_____
10. I am confident in my abilities to transfer skills and strategies I learned this term to new courses next term.	_____	_____

QUESTIONS LINKED TO THE CHAPTER LEARNING OBJECTIVES:

Questions 1–3: objective 1

Questions 4–6: objective 2

Questions 7, 8: objective 3

Question 9: objective 4

Question 10: all objectives

Reading in the Content Areas

1 *Discuss strategies to use when reading college textbooks for different disciplines and content areas.*

Understanding the differences among textbooks from various content areas can help you select the most appropriate reading and study skills strategies to use for each textbook. Increasing your awareness of characteristics of different kinds of textbooks

and the kinds of reading skills required for different content areas increases your understanding of the options you have for selecting appropriate strategies to use. **Figure 12.1** summarizes common reading skills and strategies for different content areas and kinds of textbooks.

Notice in Figure 12.1 that each of the content areas and subject matters involve working with declarative (factual) knowledge and procedural knowledge, two kinds of knowledge you first learned about in Chapter 3. The following are reminders about working with ***declarative knowledge*** and ***procedural knowledge:***

- ***Declarative knowledge*** is factual information. It involves learning definitions, names, dates, significant events, facts, symbols, formulas, rules, patterns, and specific kinds of organizational structures. It also involves learning ways to analyze or interpret materials and memorizing prototypes (models) that you can use to compare against other paragraphs or math problems.
- **Use elaborative rehearsal study strategies for declarative information.** Elaborative rehearsal strategies involve working with information in new and creative ways. These strategies may involve creating associations, mnemonics, visual mappings, and notes, as well as using processes that involve reciting and other Look-Away Techniques for feedback.
- ***Procedural knowledge*** is process information. It involves learning to apply steps or processes to achieve an outcome. In composition classes, you use procedural knowledge each time you generate ideas, gather and organize information, write drafts, edit, proofread, revise, analyze styles of writing, and critique work. In science and math classes, you use procedural knowledge each time you apply a series of steps to solve an equation or a problem.
- **Use repetition for procedural information.** Strategies to learn procedural knowledge involve reworking and solving problems *multiple times.* Repetition increases your problem-solving speed and accuracy; it helps you internalize the process so you can perform it automatically. Repetition also helps you develop the ability to generalize the steps so you can apply them to new problems. Working problems multiple times also provides you with feedback and the opportunity to correct any calculation or application errors.

CONCEPT CHECK 12.1

How do the strategies to study factual knowledge differ from strategies to study procedural knowledge?

Declarative knowledge is factual information.

Procedural knowledge is process information.

FIGURE 12.1 Common Reading Skills in Content Areas

Subjects	Declarative Knowledge	Procedural Knowledge	Organizational Patterns	Graphic Materials	Survey Chapter	Optional Overview Reading	SQ4R	Triple Q	Customized
Composition	X	X	X		X	X			X
Literature	X	X	X		X	X		X	X
Social Sciences	X	X	X	X	X	X	X	X	
Science	X	X	X	X	X	X	X	X	X
Mathematics	X	X	X	X	X	X			X

- **Learning procedural knowledge requires time.** Trying to learn procedural knowledge quickly without using practice and repetition often leads to partial and inaccurate learning, "skill gaps" that cause problems later when you try to work with higher level skills, rote memory without understanding the how and why a process works, and a sense of confusion and frustration.

CHAPTER 12 REFLECTIVE WRITING 1

On separate paper, in a journal, or online at this textbook's CourseMate Web site, respond to the following questions.

1. What are the major differences you have noticed about the different textbooks you are using this term for different courses? Be specific and provide details.
2. Which of your textbooks have the most difficult content for you to master? Explain why the content is difficult and strategies you have already used to learn from these textbooks.

Access Chapter 12 Reflective Writing 1 in your College Success CourseMate, accessed through *CengageBrain.com*.

CONCEPT CHECK 12.2

What are examples of factual information and process information that you will need to learn in a composition class?

Composition Textbooks

Composition courses encompass a wide range of writing skills—from grammar and sentence structure skills, to paragraph level skills, to essay skills involving writing for specific audiences, specific purposes, and within specific contexts. Becoming an accomplished writer involves acquiring:

- The foundation skills of grammar, punctuation, usage, and sentence structures
- A well-developed expressive vocabulary
- Broad background knowledge of many subjects
- Skills in organizing information and ideas effectively
- Analytical reading and critical thinking skills
- Effective research skills

Notice in Figure 12.1 that a *customized reading system* is effective for composition textbooks. Your instructors and authors of composition textbooks are aware of the difficulties and challenges many students experience with written expression. To address students' needs, composition textbooks include a variety of student-friendly features that you can use to work your way through a chapter: step-by-step explanations, clear examples, and ample exercises to practice skills.

Literature Textbooks

Most colleges offer a variety of literature courses with different purposes, content, and *genre* (categories of literature, such as poetry, drama/plays, and types of fiction). *Survey courses* involve the study of major writers and literary works from a specific period of time, nationality, or culture. Other literature courses may focus on specific

genres, such as short stories, poetry, mythology, essays, or novels. For many courses, *Cliff Notes*, a special series of handbooks to help you interpret pieces of literature, are available study tools that you can use.

Literature textbooks use imagery and figurative language—such as symbolism, multiple meanings, and figures of speech—to convey images, evoke emotions, develop themes and characters, and engage readers in the action of the plots. Following are common figures of speech and terminology you will encounter and need to learn to interpret in literature textbooks:

- *Metaphors* compare one object to another *without* using the words *like* or *as*.
- *Similes* compare one object to another by *using* words such as *like* or *as*.
- *Personification* gives human qualities or capabilities to objects, ideas, or animals.
- *Alliteration* is the repetitive use of one letter sound at the beginning of a series of words.
- *Hyperbole* is the use of exaggeration to create a specific effect.

Read Two or More Times

For the full emotional impact of the writing, read the selection at least two times. For the *first reading*, read through the complete selection, uninterrupted, to get an overview; do not stop to analyze or take notes. Let yourself get immersed in the content and the flow of the action. For novels, your overview reading may involve reading one chapter at a time. For the *second*, and possibly the *third reading*, read with the goal to use thorough reading strategies to analyze and interpret the key literary elements. Write comments next to important passages, take notes on paper, or create visual mappings or charts to show important details. With each reading, you comprehend on a deeper level and create a stronger impression of the information.

CONCEPT CHECK 12.3

What is the relationship between composition courses and literature courses? What do they have in common? How do they differ?

Create Schemas

Studying literature involves creating schemas for different literary forms. These schemas identify specific sets of conventions or standards, characteristics, and literary terminology used to think about and analyze the structure, content, and purpose of different kinds of literature. As you study different literary forms, you can create visual mappings to show schemas with key elements to use in analyzing or discussing each of the various literary forms. To construct schemas, pay close attention to the standard features, frameworks, patterns, and aspects of literature emphasized by your instructor. **Figure 12.2** shows a visual mapping (schema) you could use to read and analyze short stories. After reading a story once to get an overview and an emotional response from the story, read to identify important details and attach those details to the visual mapping.

Look for Organizational Patterns

The information you learned in Chapter 8 about organizational patterns directly applies to reading literature textbooks. In literature textbooks, you may encounter the term *rhetorical mode*, which means styles of writing based on specific purposes.

FIGURE 12.2 Key Elements in a Short Story

Theme: The main point, the subject, the meaning, or the purpose

Setting: The location and the time of the story

Characters: The main character and the minor characters

- **Physical characteristics:** age, gender, body type, facial features, race or ethnic group
- **Social characteristics:** family, occupation, economic status, religion, political point of view, cultural background
- **Psychological characteristics:** beliefs, motives, attitudes, personality, likes/dislikes, mental state of mind
- **Moral characteristics:** values, conflicts, beliefs, ethics

Plot: Sequence of events from beginning to a turning point, and finally to a climax or conclusion

Point of View: Who tells the story, first, second, or third person

Notice that many of the following rhetorical modes are the same or similar to the organizational patterns discussed in Chapter 8:

- Description
- Narration
- Definition
- Illustration and Example
- Division and Classification
- Comparison and Contrast
- Cause and Effect
- Analysis
- Argumentation

Social Science Textbooks

The term *social science* refers to a large category of academic disciplines that study societies and humanity from different perspectives. Many social science textbooks include topics that will be somewhat familiar to you because of your personal experiences. However, reading and studying social science textbooks involve moving beyond personal experiences and into an academic look at aspects of human relationships in and to society. Social scientists pose theories, create models, and examine trends based on research, scientific methods, and observational studies. Following are common fields of social science.

Common Fields of Social Science		
Anthropology	Finance	Marketing
Archaeology	Foreign Policy	Philosophy
Business	Geography	Political Science
Counseling	History	Psychology
Criminal Justice	Information Science	Public Administration
Economics	International Relations	Sociology
Education	Law	Women's Studies
Ethnic Studies	Linguistics	

Use the Textbook Features

Each social science textbook has its own "style or personality." After working through one or two chapters in a specific social science textbook, you will become familiar with the format and standard features characteristic of your textbook. You will notice quickly that social science textbooks are rich with graphic materials designed to create interest and curiosity, explain concepts and theories, and condense statistics and data into visual forms that are easy to read and understand. As you work with social science textbooks, spend ample time reading and studying the graphic materials and relating them to the paragraphs that contain the more extensive details and explanations.

CONCEPT CHECK 12.4

What textbook features are fairly standard for social science textbooks? What kinds of reading skills are required for social science textbooks?

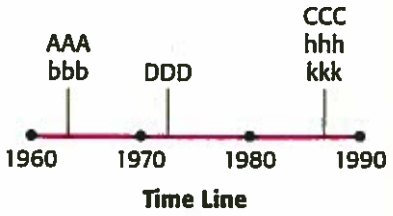
Create Time Lines for History Textbooks

History textbooks portray an event or series of events that occurred in the past. Unlike other social science textbooks, history textbooks use a narrative, storytelling approach to explain the unfolding of events influenced by specific individuals, groups, governments, and cultural factors, such as economics, religion, art, and social structures. **Figure 12.3** shows the basic structure of a time line and the steps to use to create a time line that can increase your understanding of historical events and relationships.

FIGURE 12.3 Creating a Time Line

Steps for Creating and Using Time Lines:

1. In equal intervals of time, label the horizontal line.
2. Above the horizontal line and the corresponding year, write the historical events, such as a war, treaty, economic shift, or political leadership that occurred in that time period.
3. Continue to add events to your time line as you work through the chapters.
4. Look for patterns, trends, and cause-and-effect relationships among the political, social, and cultural events.



Time Line

Science Textbooks

The "hard sciences" or natural sciences include biology, chemistry, computer science, engineering, environmental science, geology, and physics. Science textbooks are densely written and filled with declarative knowledge and procedural knowledge. The study of the sciences also includes:

- Inductive arguments: observable experiments, evidence, or proof to arrive at a conclusion.
- Hands-on, personal laboratory demonstrations, experiments, or observations.
- Emphasis on understanding how parts relate to whole concepts or frameworks.
- Conceptual understanding: understanding scientific concepts in order to solve problems in the appropriate context.
- Problem-solving skills and analysis: knowing how to approach a problem, steps to solve a problem, and problem-analysis to explain the thinking processes used to reach a solution.
- Applications: using concepts and problem-solving skills in everyday applications.
- The scientific method: experimentation, hypotheses, collect and analyze data, and draw conclusions. See *The Scientific Method of Inquiry*, page 357

Acquire Background Knowledge

When topics or concepts are new to you, you may lack background knowledge or experiences with the subject matter. Learning basic information about a subject creates a schema in memory upon which you can attach more in-depth or complex concepts and details. To lay a foundation for the new material, use the following suggestions:

- *Videos:* Check your science lab and library for available videos to view.
- *Internet:* Conduct Internet searches to locate and read articles about the subject.
- *Magazines:* Locate magazine articles related to the topic.
- *Surveying the chapter:* Survey the chapter before thorough reading and *before* the lecture on the topic.
- *Overview reading:* Conduct an uninterrupted overview reading of a chapter or a section of a chapter before thorough reading and *before* the lecture on the topic if possible.

Read Slowly and Thoroughly

Science textbooks are dense with complex scientific processes and reasoning, theories, predictions, explanations, evidence, patterns, numbers, symbols, formulas, graphic materials, and definitions. Because of the complexity of information in science textbooks and the critical thinking skills associated with the study of science, your reading goal for science textbooks is to read slowly, sometimes sentence by sentence, to comprehend, process, and integrate information. Another goal is to use your repertoire of reading and study strategies so you can adjust to the content and the textbook level of difficulty.

Use a 3:1 Study Ratio for Some Science Classes

After surveying and possibly conducting an overview reading of a chapter, begin the process of thorough reading. For reading and studying science textbooks, you may need to use a 3:1 ratio in order to have ample time to read slowly and carefully, comprehend and integrate information, create notes or study tools, complete lab assignments, and finish textbook assignments.

CONCEPT CHECK 12.5

Define the term 3:1 ratio. Why is the 3:1 ratio often essential to use for science courses? Be specific.

Mathematics Textbooks

Studying mathematics is similar to studying a foreign language: it involves learning a language of symbols and formulas. Studying mathematics is also similar to studying fields of science: it involves learning and using formulas, equations, proofs, and problem-solving steps to reach solutions. The following points about studying math and using your math textbooks are important to remember:

- Studying mathematics involves learning a progression of concepts and skills, each building on previously learned information and setting a foundation for higher level skills. The process is ongoing, for there is always another higher level of mathematics to master.
- In learning math concepts, you often need to direct your mind to switch back and forth between new information and information stored in long-term memory. The process is complex and involves many cognitive processes, so strive to maintain undivided attention as you work with your math textbooks and notes.
- Utilize all available resources: math lab videos, tutors, tutorials, or other supplemental materials.
- Using a Customized Reading System is often the most effective system to use for math textbooks. Use the three steps on page 234 to devise a step-by-step system to read and work with your math textbooks. See Figure 8.6, page 234 for an example of a Customized Reading System for a math textbook.

Use Effective Time Management Strategies

Working memory requires time to understand new abstract concepts, connect chunks of information, create associations, retrieve learned information, and perform a variety of functions to complete steps of a process. Use the following time-management strategies to create ample time to process math skills and work with procedural knowledge.

- Study math every day of the week. Working with math problem sets and reviewing key terms, formulas, and steps enhance the learning process.
- Use a 3:1 study ratio to provide ample time to practice problem-solving steps, recall prototypes, rework previous problems, increase problem-solving speed, and increase accuracy.
- Provide time in your study blocks to survey chapters or topics before lectures so you are familiar with key terms and familiar with the examples and prototypes that appear in the textbook.
- Schedule a study block shortly after class to begin working problem sets.
- Schedule time to work with a study partner, with a tutor, or in a study group.

Study Examples and Memorize Prototypes

A ***prototype*** is a model of a specific type of math problem. By memorizing and understanding a prototype, you can then use it as a reminder of the steps to use to solve that problem type. Prototypes often appear when the textbook introduces you to a new type of math problem or equation. Explanations and examples accompany the prototype. Study each example carefully, step by step, until you can follow the steps and understand the logic behind the process. Practice verbally explaining each step of the process to solve that type of problem; then express the same information using mathematical symbols and equations. Read the equation out loud. **Figure 12.4** shows a prototype for dividing fractions.

A prototype is a model of a specific type of math problem.

FIGURE 12.4 Prototype: Dividing Fractions

How to Calculate

- To divide fractions, invert the second fraction and multiply.

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{a \times b}{b \times c}$$

For example,

$$\frac{2}{15} \div \frac{4}{9} = \frac{2}{15} \times \frac{9}{4} = \frac{\cancel{2}^{1}}{15_{5}} \times \frac{\cancel{9}^{3}}{\cancel{4}_{2}} = \frac{1 \times 3}{5 \times 2} = \frac{3}{10}$$

↑ invert second fraction and multiply

Example 1–6: Simplify and express the answer in reduced form.

1) $\frac{3}{7} \div \frac{9}{14}$

a) Invert and multiply.

$$\frac{3}{7} \times \frac{14}{9}$$

b) Reduce.

$$\frac{\cancel{3}^{1}}{\cancel{7}_{1}} \times \frac{\cancel{14}^{2}}{\cancel{9}_{3}} = \frac{2}{3}$$

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Without referring to the text, rework the example problems and check your accuracy. Correct any mistakes immediately. Memorize and use the *prototype* (model) on the problem sets that immediately follow new examples when the problem sets involve the same pattern or type of math problems. Compare a new problem to the example problem (the prototype) to verify that both belong in the same category or type of problem. Then apply the problem-solving steps.

EXERCISE 12.1

Reading in the Content Areas Inventory

Go to Exercise 12.1 Reading in the Content Areas Inventory in Appendix C. Complete the inventory to evaluate the effectiveness of the reading strategies you use to read in the content areas.

CHECK POINT 12.1

Answers appear on page B4

True or False?

1. You can identify and use prototypes to recall steps of a process in composition, math, and science textbooks.
2. Factual knowledge is also called declarative knowledge; elaborative rehearsal strategies are recommended for learning factual knowledge.
3. Literature textbooks are the only type of textbook that uses figurative language.
4. You can strengthen your comprehension skills by acquiring background knowledge about an unfamiliar topic before you begin reading the textbook.

Access Chapter 12 Practice Quiz 1: Different Textbooks under "Interactive Quizzes" in your College Success CourseMate, accessed through *CengageBrain.com*.

Bloom's Taxonomy

❷ *Explain the six levels of cognitive processing in the original and the revised Bloom's Taxonomy.*

As you continue your college journey and enroll in more advanced or higher level courses, the content and the curriculum become increasingly more demanding. Understanding different levels of thinking and processing skills can assist you in analyzing information and responding on appropriate levels. Understanding Bloom's Taxonomy (classification system) will also help you understand why some textbook, classroom, or test questions are more challenging and difficult to answer.

CONCEPT CHECK 12.6

The term "taxonomy" means "classification." What does Bloom's Taxonomy classify? What are the levels in Bloom's classification system?

The Original Bloom's Taxonomy

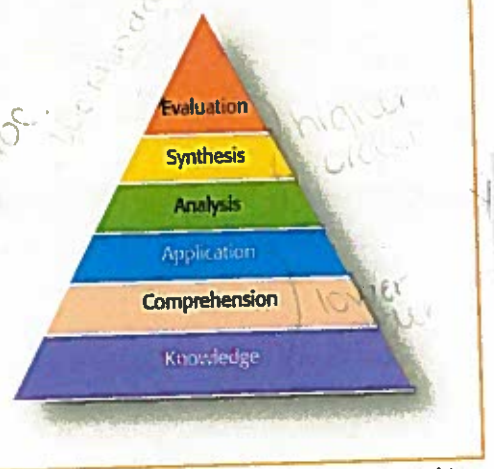
Bloom's Taxonomy is a classification system for levels of cognitive processes, learning, and intellectual behaviors. In 1956, a psychologist named Benjamin Bloom, along with several colleagues, developed *Bloom's Taxonomy*, a model for educators to use to identify educational goals and objectives, design curriculum, and promote higher-level thinking and questioning skills. Chapter 11 Critical Thinking, page 334 introduced you to the original Bloom's Taxonomy. **Figure 12.5** shows the original model of Bloom's Taxonomy with the six levels or categories of cognitive skills. Following are important points about the first three levels of Bloom's Taxonomy:

- **Knowledge Level:** The ***Knowledge Level***, also known as the Remembering Level, is the lowest, most basic level of thinking in Bloom's Taxonomy. On this level, cognitive skills involve remembering and recalling specific, previously learned information. Emphasis is on factual information, such as dates, people, places, events, vocabulary terms, key ideas, and information from diagrams or charts. Learning actions and types of questions on this basic level may include the following words:

  define, describe, enumerate, identify, label, list, locate, match, name, quote, select, show, tell, what, when, where, who

The Knowledge Level, also known as the Remembering Level, is the lowest, most basic level of thinking in Bloom's Taxonomy.

FIGURE 12.5 Bloom's Taxonomy—Original Model



Anderson & Krathwohl, *A Taxonomy for Learning, Teaching, and Assessing*, © 2001 by Addison Wesley Longman, Inc. Reproduced by permission of Pearson Education, Inc.

- **Comprehension Level:** The ***Comprehension Level***, also known as the Understanding Level, is the second level in Bloom's Taxonomy. This level involves understanding information, grasping meanings of information you read or hear, and demonstrating your understanding through some type of activity. Emphasis may be on explaining meanings, interpreting information, interpreting graphs or charts, showing cause and effects, or providing examples. Learning actions and types of questions on this level may include the following words:

associate, classify, compare, contrast, describe, differentiate, discuss, estimate, explain, generalize, illustrate, interpret, organize, outline, paraphrase, predict, summarize, trace

- **Application Level:** The ***Application Level***, also known as the Applying Level, is the third level in Bloom's Taxonomy. This level involves applying previously learned information to a new learning task. To work on this level requires that you already have the necessary knowledge and skills from the *knowledge* and the *comprehension* levels. Application may emphasize applying rules, models, prototypes, facts, steps, or processes to new situations or new problems to solve. Learning actions and types of questions may include the following words:

apply, calculate, chart, classify, collect, compute, construct, demonstrate, determine, develop, discover, graph, illustrate, modify, predict, produce, project, show, solve, use, utilize

The Comprehension Level, also known as the Understanding Level, is the second level in Bloom's Taxonomy.

The Application Level, also known as the Applying Level, is the third level in Bloom's Taxonomy.

The Analysis Level, also known as the Analyzing Level, is a complex, higher-order thinking level and is the fourth level in Bloom's Taxonomy.

The three categories of cognitive skills and levels of questions that appear on the top half of Bloom's Taxonomy are higher-order thinking skills. Actions and responses to questions in the categories of *analysis, synthesis,* and *evaluation* require deeper levels of thinking, processing, and responding. These top three levels consist of *critical thinking skills.* (You will learn more about critical thinking skills in the following section.) Following are important points about the higher-order thinking skills that complete Bloom's Taxonomy:

- **Analysis Level:** The ***Analysis Level***, also known as the Analyzing Level, is a complex, higher-order thinking level and is the fourth level in Bloom's Taxonomy. Analysis involves breaking down information or material into its smaller parts. Analysis may also include a variety of other higher-order thinking and learning skills:
  - Identifying and examining the individual parts of the whole
  - Identifying and examining the organizational structure of the material, such as an essay or a musical arrangement
  - Identifying and examining patterns and relationships, such as cause-effect
  - Analyzing information for faulty assumptions or lack of sufficient details to support a point of view, main idea, or larger thesis

In order to think and respond on the Analysis Level, one needs to have the skills of *knowledge, comprehension,* and *application.* In other words, it would be difficult, or even perhaps impossible, to think on the analysis level about an unfamiliar subject of which the learner has no background knowledge or experience. Learning actions and types of questions may include the following words:

CONCEPT CHECK 12.7

What are the higher-order thinking skills in Bloom's Taxonomy? How do they differ from the lower-order thinking skills?

analyze, arrange, classify, categorize, compare, contrast, connect, diagram, differentiate, divide, examine, explain, illustrate, infer, investigate, order, outline, select, separate, subdivide

- **Synthesis Level:** The **Synthesis Level**, also known as the Creating Level, is a level in Bloom's Taxonomy that covers more complex thinking skills and involves creating a "whole picture." Synthesis involves putting parts together to form the whole or the "big picture." Synthesis may also include a variety of other higher-order thinking and learning skills:
  - Creatively integrating and showing new patterns or relationships
  - Creating or designing a new product, process, or way to solve a problem
  - Organizing and explaining ideas in a project, speech, or research paper
  - Using information from several sources to create an original way to show, classify, or group information
  - Combining and integrating information from several sources
  - Using divergent thinking to connect ideas, show relationships, and draw conclusions
  - Responding to "What if..." statements

The Synthesis Level, also known as the Creating Level, is a level in Bloom's Taxonomy that covers more complex thinking skills and involves creating a "whole picture."

As with the Analysis Level, to think and respond on the Synthesis Level requires strong background information acquired in the three lower-order sets of skills: *knowledge, comprehension,* and *application.* It also requires creative thinking and ability to create or produce information in a new, unique form. Learning actions and types of questions may include the following words:

combine, compile, collaborate, compose, construct, create, design, develop, devise, formulate, generalize, hypothesize, invent, integrate, modify, plan, prepare, rearrange, revise, substitute, validate, what if?

- **Evaluation Level:** The **Evaluation Level**, also known as the Evaluating Level, is one of the highest levels in Bloom's Taxonomy. It involves judging or critiquing the value, importance, accuracy, or worthiness of information using a specific set of criteria. Evaluation in the original model is the highest order of thinking as all other levels of thinking skills are activated at this level. Evaluation may include a variety of higher-order thinking and learning skills:
  - Using personal values and opinions to evaluate or judge the value of written materials, products, or concepts
  - Judging or evaluating information or a piece of work by using a personally defined set of criteria
  - Judging or evaluating information or a piece of work by using a set of standardized criteria established for the topic or activity
  - Evaluating the soundness or accuracy of differing opinions or sources of information on a given topic
  - Defending a position or point of view by providing strong proof or support.
  - Making recommendations for a specific problem, project, or activity based on specific values and criteria

The Evaluation Level, also known as the Evaluating Level, is one of the highest levels in Bloom's Taxonomy.

Learning actions and types of questions may include the following words

appraise, argue, assess, compare, conclude, convince, critique, debate, decide, defend, determine, discriminate, evaluate, explain, grade, interpret, judge, justify, measure, persuade, rank, rate, recommend, select, summarize, support, test

EXERCISE 12.2

Cognitive Levels in Bloom's Taxonomy

DIRECTIONS

1. Writing practice test questions is one effective strategy to prepare for tests and review course materials. Work with a partner or by yourself to create practice test questions for an end-of-the-term review.
2. On separate paper, list all six levels of Bloom's Taxonomy.
3. Refer back to the information for each level in the model: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. Review the key words frequently associated with each level.
4. Write *two* review questions that use key words from the Knowledge Level. Then continue by writing *two* review questions for each of the remaining five cognitive levels.
5. You may be asked to use your questions in class to help other students review information for the final exam in this course.

The Revised Bloom's Taxonomy

Educators on all levels of our education system use Bloom's Taxonomy as a tool to define educational objectives and create curriculum. In the mid-1990's, a group of educators, which included Dr. Lorin Anderson, a former student of Benjamin Bloom, and Dr. David Krathwohl, who co-authored with Bloom, revised Bloom's Taxonomy so it reflects the current emphasis on using the cognitive levels to write educational objectives. **Figure 12.6** shows the revised model for Bloom's Taxonomy. Note the following changes:

- The names of the levels were changed from nouns to verbs to represent a more active form of thinking.
- "Knowledge" now appears as "Remembering."
- "Comprehension" now appears as "Understanding."
- The top two levels have been rearranged, so "Evaluating" is now the fifth, not the sixth level of thinking.
- "Synthesis" has been renamed to "Creating," which appears as the highest order of thinking skills.

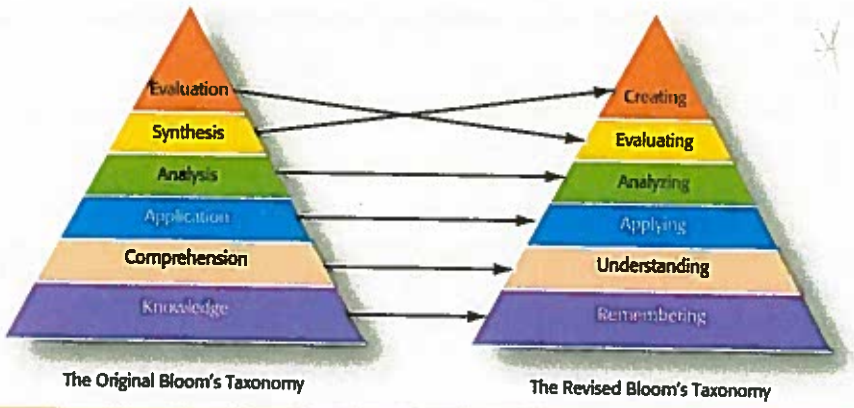
In *Theory of Practice, Autumn 2002,* Dr. David R. Krathwohl, one of the co-authors of the revised Bloom's Taxonomy, provides additional information about the significant changes that now appear in the revised Bloom's Taxonomy:

- Knowledge, now referred to as Remembering, has several subdivisions:
  - ***Factual Knowledge:*** The basic elements that students must know to be acquainted with a discipline or solve problems. This includes, for example, knowledge of terminology and knowledge of specific details.
  - ***Conceptual Knowledge:*** The interrelationships among the basic elements within a larger structure that enable them to function together. This includes,

CONCEPT CHECK 12.8

In terms of wording and position of specific levels, what changes were made in the revised version of Bloom's Taxonomy?

FIGURE 12.6 The Revised Bloom's Taxonomy



Anderson & Krathwohl, *A Taxonomy for Learning, Teaching, and Assessing*, © 2001 by Addison Wesley Longman, Inc. Reproduced by permission of Pearson Education, Inc.

for example, knowledge of classifications, categories, principles, generalizations, theories, models, and structures.

- ***Procedural Knowledge:*** How to do something; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods. This includes, for example, knowledge of subject-specific skills, algorithms, techniques, methods, and criteria for determining when to use appropriate procedures.
- ***Metacognitive Knowledge:*** Knowledge of cognition in general as well as awareness and knowledge of one's own cognition. This includes, for example, knowing how to use strategies, understanding cognitive tasks, and self-knowledge.

- The Creating Level involves putting elements together to form a novel, coherent whole or make an original product. It includes generating, planning, and producing.

Modified from Source: "*A Revision of Bloom's Taxonomy: an Overview—Benjamin S. Bloom*," Theory into Practice, Autumn, 2002. ©2002 The Ohio State University, College of Education ©2003 Gale Group (Cengage Learning)

GROUP PROCESSING

A Collaborative Activity

Form groups of three or four students. Complete the following directions.

1. On a large paper, create the following chart.
2. Under each of the levels of the revised Bloom's Taxonomy, brainstorm to list as many processes, activities, and strategies that you recall learning and using in this course that worked on the levels shown on the chart. Ask yourselves questions, such as *What did we do that required us to remember information? What strategies focus on remembering different kinds of information?*
3. Each group may be asked to share its chart with the class.

Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

Bloom's Taxonomy and You

Essential Study Skills is based on a metacognitive approach to learning. The focus began by learning about cognitive processes and how you specifically process information most effectively. This provided you with the skills to *apply* your understanding to new situations and new materials and to *analyze* information in order to work with it as you read textbooks, created notes, and developed study tools. Many of the study tools you developed involved *creating* new forms to express the information.

Even though this textbook did not specifically identify the levels of thinking in Bloom's Taxonomy, you have learned to use the levels of Bloom's Taxonomy in a multitude of ways. Each chapter contains terminology and strategies that you needed to *remember*.

You learned strategies for *understanding* what you read and *applying* what you learned to this textbook and to textbooks from other courses. You learned to break information into smaller units, identify organizational patterns, and interpret visual graphics; in other words, you have already experienced the process of *analyzing* information. Each time you created study tools, such as comparison charts with multiple subjects, or flashcards for multiple chapters, you *created* (or synthesized) information. Even though this textbook did not include extensive reading skills for *evaluating* information, in Chapter 8, you learned about evaluating Internet information in terms of reliability, quality and usefulness.

Being aware of the levels of thinking in Bloom's Taxonomy will benefit you by helping you to:

- Understand textbook and test questions and understand the lower-order or higher-order information expected of you when you answer the questions
- Create effective questions on multiple levels when you predict and practice writing your own test questions to review course information and prepare for tests
- Realize that every course has basic learning and more complex learning, all of which require you to push yourself to learn more thoroughly and think more deeply

EXERCISE 12.3

Transfer These Skills

DIRECTIONS

1. Look at chapter questions in three or more of your textbooks.
2. Create a list of at least 10 questions from those textbooks. Strive to locate questions that demonstrate use of different levels of questioning.
3. Identify the level of questioning you believe is used in each question. Write the level next to each question.
4. Bring your list of questions to class. You may be asked to turn them in to your instructor, or you may be asked to share them in a small group or with the class.

CHECK POINT 12.2

Answers will vary.

Short-Answer Questions

On separate paper, answer each of the following questions.

1. Compare the original Bloom's Taxonomy to the revised Bloom's Taxonomy. Summarize the changes that appear in the revised levels of cognition.
2. Why do you think the authors of the revised Bloom's Taxonomy believe the new levels of cognition are more effective and better suited for contemporary use?
3. How can you use Bloom's Taxonomy to improve your academic performance?

Access Chapter 12 Practice Quiz 2: Bloom's Taxonomy under "Interactive Quizzes" in your College Success CourseMate, accessed through *CengageBrain.com*.

Critical Thinking Skills

3 *Define the term "critical thinking" and discuss characteristics of critical thinkers and steps in the Scientific Method of Inquiry.*

In an age of information overload, we often feel the need to remember and understand a vast amount of information, yet research continually changes previously learned information and provides us with new information that was unknown or undiscovered in the past decade. As we earnestly strive to remember and understand new information, to be an effective thinker requires that we learn the lower-order cognitive skills of Bloom's Taxonomy but then push ourselves to think more deeply, more seriously, and more critically about the information we encounter. With access to the Internet and endless databases, we easily can locate information, but to understand, use, and evaluate the information effectively requires us to know how to think critically.

Critical thinking is higher-order, purposeful, skillful thinking that focuses on gathering, understanding, and utilizing relevant information to reach logical, trustworthy conclusions about what to believe, what to do, or what decisions to make in everyday life.

CONCEPT CHECK 12.9

What is the relationship between Bloom's Taxonomy and critical thinking skills?

Critical thinking is higher-order, purposeful, skillful thinking that focuses on gathering, understanding, and utilizing relevant information to reach logical, trustworthy conclusions about what to believe, what to do, or what decisions to make in everyday life.

Critical Thinkers

Critical thinking involves a wide range of cognitive and behavioral skills. Following are goals for you to use to become a more powerful critical thinker:

- Be inquisitive and ask questions before evaluating information as trustworthy, accurate, or useful.
- Use reflective judgment about what is observed or what appears in writing.
- Engage in processes that evaluate the quality of thinking, decision-making criteria, and personal decision-making skills.
- Use self-assessment and self-regulatory skills to adjust thinking, modify problem-solving strategies, and make decisions about what to think or what to do.
- Distinguish between facts or valid arguments and opinion and biased information.
- Use a clearly defined set of criteria to analyze and evaluate information or decision-making processes.
- Examine information and situations in order to find new solutions.

- Use metacognitive strategies, which includes thinking about one's own thinking.
- Show open-mindedness and willingness to explore and evaluate your own thinking.
- Engage intellectually in discussions and debates by using logical arguments and trustworthy information.
- Recognize problems and examine and evaluate possible solutions or conclusions.
- Use Bloom's higher-order cognitive processes, which include the following kinds of thinking activities:

analyze	*convince*	*explain*	*outline*
apply	*create*	*formulate*	*persuade*
appraise	*critique*	*generalize*	*plan*
argue	*debate*	*grade*	*prepare*
arrange	*decide*	*hypothesize*	*propose*
assess	*defend*	*illustrate*	*rank/rate*
categorize	*design*	*infer*	*rearrange*
classify	*determine*	*integrate*	*recommend*
collaborate	*develop*	*interpret*	*revise*
combine	*devise*	*invent*	*select*
compare	*diagram*	*investigate*	*summarize*
compile	*differentiate*	*judge*	*support*
compose	*discriminate*	*justify*	*synthesize*
conclude	*evaluate*	*measure*	*test*
construct	*examine*	*modify*	*validate*

The Scientific Method of Inquiry

Critical thinking skills are essential cognitive skills to use in all of your courses as well as in your personal life as you strive to understand, evaluate, and make choices or decisions. In the fields of science and mathematics, critical thinking skills are essential and emphasized each time you use the Scientific Method of Inquiry. Curriculum in these fields of study center around understanding and applying the Scientific Method.

The Scientific Method of Inquiry is a process based on observation, experimentation, and the development of theories or natural laws.

The ***Scientific Method of Inquiry*** is a process based on observation, experimentation, and the development of theories or natural laws. Following is an explanation of the Scientific Method of Inquiry from *An Introduction to Physical Science:*

> The process of investigating nature is known as the **scientific method**, which holds that no concept or model of nature is valid unless the predictions are in agreement with experimental results. That is, all hypotheses—tentative answers—should be based on as much relevant data as possible and then should be tested and verified. If a hypothesis does not withstand rigorous testing, it must be modified and retested, or rejected and replaced by a new hypothesis. An attitude of curiosity, objectivity, rationality, and willingness to go where the evidence leads is associated with use of the scientific method. Note carefully that the scientific method not only is used in scientific work but also is applicable in many areas of our daily lives.
>
> Source: Shipman et al. *An Introduction to Physical Science*, 10ED. Houghton Mifflin Company, © 2003, p. 3. Reprinted with permission.

The following points in the explanation of the Scientific Method are essential critical thinking skills that you can apply to academic as well as to personal life situations:

- No concept or model is valid unless based on experimental results.
- All tentative answers, conclusions, or solutions should be based on as much relevant data as possible.
- You should test and verify the data.
- If the answers, conclusions, or solutions do not withstand testing and verification, they must be modified, retested, rejected, or replaced by another model.
- An attitude of curiosity, objectivity, rationality, and willingness to go where the evidence leads is an essential part of the Scientific Method.

Figure 12.7 shows the steps used in the Scientific Method. To increase you understanding of this essential process, read the explanation that appears next to the figure.

CONCEPT CHECK 12.10

Explain how you can use the principles and steps in the Scientific Method to make decisions in your personal life. Be specific.

FIGURE 12.7 The Scientific Method is a formal procedure that scientists use to answer questions

The scientific method

The **scientific method** of inquiry is based on three main concepts: observation, experimentation, and the development of theories or natural laws. The first step in the scientific method is the actual observation and recording of facts. Much of the work of a scientist involves **observation** and the collection of data. This helps scientists to gain as much information as they can about the natural phenomena they are studying and then record that information in an organized way. Observation also involves conducting experiments. **Experiments** are controlled observations that help to answer questions about what scientists are trying to discover. The next step in the scientific method is the formulation of a **theory** that might explain how or why the natural phenomenon that is being studied is occurring. This is also called a **hypothesis**, which is an explanation that is supported by a set of facts. The final step in the scientific process is the formulation of a natural law that explains the phenomenon that is being studied. The formulation of a natural or a physical law helps to explain how certain aspects of the natural world operate and, more importantly, how they can be used to make predictions. Scientists often use observations they have made in the past to make inferences about what might occur in the future. An **inference** is a prediction or conclusion that is made about a future event based on previous scientific observations. The scientific method is a formal and organized procedure that scientists around the world use to make accurate investigations of the natural world.

Source: Copyright © 2000 Howard Gardner. Reprinted by permission of Basic Books, a member of the Perseus Books Group.

CHECK POINT 12.3

Answers appear on page B4

True-False

____ 1. Critical thinking is the process of criticizing other people's ideas.

____ 2. Critical thinkers contemplate, evaluate, and judge information instead of focusing on memorizing or remembering information.

____ 3. Critical thinking skills occur frequently in science and math courses but seldom are required in literature or social science courses.

____ 4. Critical thinkers use a variety of skills and strategies to develop their points of view and opinions about a specific topic.

____ 5. Critical thinking also involves metacognitive strategies.

Access Chapter 12 Practice Quiz 3: Critical Thinking under "Interactive Quizzes" in your College Success CourseMate, accessed through *CengageBrain.com*.

ACTIVITY

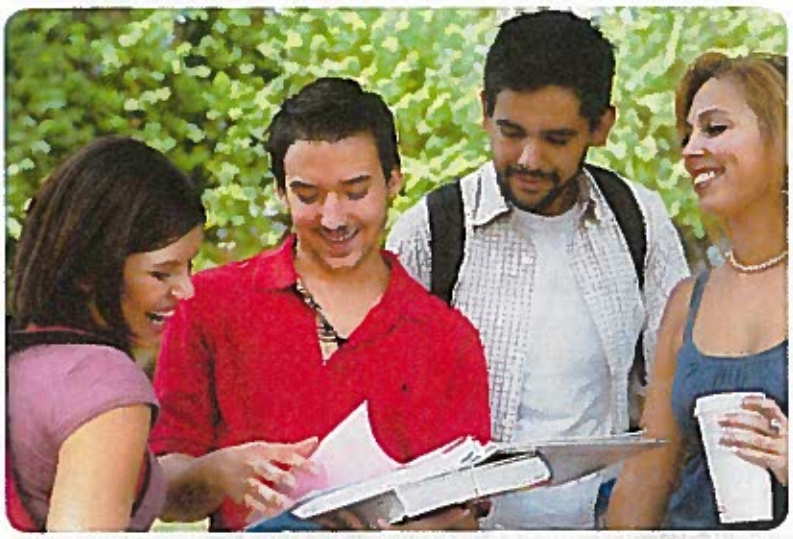
Chapter 12 Critical Thinking

DIRECTIONS

1. Read the Excerpt 11: The Species Called Homo-Simpsons in Appendix D. After expressing some interesting points about people's dislike of critical thinking skills, author Randy Alcorn carries his thesis into the political arena.
2. After you have read Excerpt 11, read the following questions that appeared with the excerpt in the textbook *Viewpoints*. (Only seven of the sixteen questions used in the textbook appear below.)
   - Can you identify which level of Bloom's Taxonomy is used in each question?
   - Do the questions give you a better understanding of what is meant by "critical thinking" skills?
3. Your instructor may ask you to answer the following questions that appeared with the excerpt or to discuss answers in class.

QUESTIONS FROM THE TEXTBOOK:

a. According to Alcorn, what is the homo-simpson's thought process?
b. What is the thesis of this selection? Rewrite it in your own words.
c. Does Alcorn provide enough evidence to support his thesis?
d. What is the organizational pattern used in paragraphs 4 and 5?
e. What is the author's attitude towards his subject? How can you tell?
f. Do you agree or disagree with the author that "too many people seem to find rational, analytical thought unpleasant, difficult and too-time consuming?" Why?
g. What can you infer about Alcorn's opinion of George W. Bush as president?



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Throughout this term you have learned an array of study skills strategies to improve your academic performance. The true value of these skills will be apparent next term when you apply these skills to new courses and new learning situations. What essential skills will you use consistently next term to continue increasing your academic performance and success?

Culminating Activities for Essential Study Skills

Complete the Culminating Activities for Essential Study Skills.

You have worked hard this term to acquire new study skills strategies and new ways of learning, processing, remembering, and applying these strategies to coursework materials. The overall process required you to examine your habits, behaviors, attitudes, and strategies and then be willing to try new ways of processing information and performing in the classroom. Throughout this term, you also have increased your understanding of "what it takes" to succeed in the world of academics. However, the true value of this course will be known only in the following terms when you make a conscious decision to continue using what you have learned this term. Carrying these skills forward will contribute to your continued successes in your life as a student.

Planning to Carry Skills Forward

As soon as the next term begins, you will be swept into the process of becoming familiar with new textbooks, new instructors, and new course content. Before you begin the process of a new term, plan to carry skills forward that you learned this term. You can begin by doing the following:

- Preview your new textbooks. Become familiar with the front matter and the back matter of each textbook.
- Begin to organize your monthly and your weekly time-management schedules for the new term.
- Create an Essential Study Skills Resource Notebook. Exercise 12.4 provides you with directions for compiling essential strategies, charts, and information that you know will be valuable to have at your fingertips next term.

EXERCISE 12.4

Create an Essential Study Skills Resource Notebook

DIRECTIONS

1. Create your own *Essential Study Skills Strategy Notebook* to use as a reference resource for future classes through your college years.
2. Identify essential strategies for different topics from chapters in your textbook. You may photocopy the Essential Strategy charts in the textbook, or you may create your own lists and descriptions of essential strategies that you found to be most useful.
3. Identify any other topics that you believe will be useful reference materials to have readily available later in other classes. For example, you may want to remove the sections on time management schedules and forms, or the section for organizational patterns or how to study visual materials. You may also wish to include several of the inventories in Appendix C. Remember, this is your notebook, so you are the best person to identify the strategies and information that will be useful for you in future classes.
4. Remove the Essential Test-Taking Skills Guide in Appendix A. Include it in your notebook.
5. Organize your notebook so it is functional, useful, and easy to manage. Use dividers to label different sections of information.

Preparing for Your Final Exam

A wealth of resources are available in this textbook to help you prepare for your final exam. One way to prepare is to complete the interactive practice, chapter, and enhanced quizzes for the content of this course. Practice tests that cover content for the course appear in Exercise 6.4 in Appendix C and in the list of interactive quizzes that appear on the CourseMate Web site for Appendix A. Exercise 12.5 provides you with additional activities to prepare for your final exam.

EXERCISE 12.5

Reviewing Skills, Strategies, and Terminology

DIRECTIONS

Your instructor may assign one or more of the following review options. You may also choose to complete the review options that you believe are most beneficial to review course skills, strategies, and terminology.

OPTION 1: CREATING SUMMARY NOTE CARDS

1. Form a group with three or four students. Each student in your group selects a different chapter from this textbook for this review activity.

2. Outside of class, each student needs to create a comprehensive set of index card notes for his or her chosen chapter. Include definition, question, and category cards.
3. Bring the index card notes to the next class. Take turns using the sets of cards to quiz the other students in your group.

OPTION 2: COMPILE "BIG PICTURE" INFORMATION

1. Form a group with three or four students. Use the following "Big Picture" topics. Members of the group should select different topics so you will have more review materials to use to prepare for the exam.

   Topics: visualization, recitation, elaborative rehearsal, Principles of Memory, time management, self-management skills, reading strategies, notetaking strategies, listening skills, test-taking strategies, Bloom's Taxonomy, or any additional topics you wish to review.

2. Each member needs to create a visual mapping, a hierarchy, a comparison chart, or an outline to use to review the essential strategies for his or her topic.
3. Consider asking each member to provide photocopies of his or her work to share with the group. Review materials together.

OPTION 3: REVIEW TERMINOLOGY

1. Go online to the CourseMate Web site. For each chapter, print the Online Glossary of terms for each chapter.
2. Work in a group or with a partner. Take turns reciting and explaining definitions for each term. Use a three-part definition: name the category, define the term, and add one more detail to expand the definition.
3. Highlight the definitions that you need to review further.

Access Chapters 1-12 Online Glossary in your College Success CourseMate, accessed through *CengageBrain.com*.

EXERCISE 12.6

Completing the End-of-the-Term Profile

PURPOSE: Throughout this term you have completed the chapter profiles and have recorded your results in Appendix B on the Master Profile Chart. As you may have noticed, the profile questions relate to the learning objectives for the chapter as well as to your habits and attitudes toward the subject. As you acquired more skills throughout the term, very likely your habits and attitudes changed. Completing the end-of-the-term profile will demonstrate the progress you have made this term.

Exercise 12.6 (cont.)

DIRECTIONS

1. If you have not already done so, use one color of pen to connect the responses that show your original profile scores. Your Master Profile chart will then appear as a line graph that connects the twelve points on the chart.
2. Complete the directions for the "End-of-the-Term Profile" located in Appendix B.
3. Compare your pre- and your post-profile scores.

CHAPTER 12 REFLECTIVE WRITING 2

On separate paper, in a journal, or online at this textbook's CourseMate Web site, respond to the following questions.

1. Examine your pre- and post- profile scores on your Master Profile Chart in Appendix B. In which areas did you show the most progress or gain? What strategies did you learn to use to produce the change? Be specific.
2. Which areas on your Master Profile Chart show the least gains? Why do you think this is so? What strategies do you still need to use more effectively for those categories?

Access Chapter 12 Reflective Writing 2 in your College Success CourseMate, accessed through *CengageBrain.com*.

Terms to Know

By yourself or with a partner, practice reciting or writing definitions for the following terms. You may also practice defining these terms by using the online flashcard programs or comparing your answers to the online glossary.

declarative knowledge p. 351

procedural knowledge p. 351

prototype p. 357

Knowledge (Remembering) Level p. 359

Comprehension (Understanding) Level p. 360

Learning Objectives Review

1 *Discuss strategies to use when reading college textbooks for different disciplines and content areas.*

- Composition, literature, social science, science, and math textbooks each have unique characteristics. You can select the most appropriate reading systems and strategies for textbooks when you understand the characteristics and skills commonly associated with specific fields of study.
- A Reading in the Content Areas Inventory helps you identify effective reading strategies that you are using and strategies that you can begin using to increase your reading performance.

2 *Explain the six levels of cognitive processing in the original and the revised Bloom's Taxonomy.*

- Bloom's Taxonomy is a classification system for levels of cognitive processes or thinking. Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation are the six levels in the original Bloom's Taxonomy.
- The first three levels involve lower-order thinking skills; the final three levels involve higher-order, critical thinking skills.
- The revised Bloom's Taxonomy renamed some of the levels and converted the titles of levels from nouns to verbs. Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating are the six levels of the revised version.
- Understanding the levels of thinking and knowing key words frequently used in questions on each level help you better understand textbook and test questions and realize the importance of engaging in both basic and complex forms of thinking.

3 *Define the term "critical thinking" and discuss characteristics of critical thinkers and the steps in the Scientific Method of Inquiry.*

- Critical thinking is higher-order, skillful, and more complex form of thinking that involves the higher level thinking skills in Bloom's Taxonomy.
- Critical thinking, which involves gathering and understanding information and then evaluating the information, results in drawing reasonable, logical conclusions about what to believe, what to do, or what decisions to make in every day life.
- The Scientific Method of Inquiry is a process based on observation, experimentation, and the development of theories or natural laws. The steps in the Scientific Method involve critical thinking skills that you can use in the academic world and in your personal life.

4 *Complete the Culminating Activities for Essential Study Skills.*

- The effectiveness of this course will be determined next term and future terms as you carry forth the skills you have learned. You can plan now to continue using essential strategies next term in your new courses.
- Culminating activities include creating a resource notebook, preparing for your final exam, reviewing terminology, and completing your Master Profile chart.

Terms to Know

Application (Applying) Level p. 360
Analysis (Analyzing) Level p. 360
Synthesis (Creating) Level p. 361
Evaluation (Evaluating) Level p. 361
critical thinking p. 365
Scientific Method of Inquiry p. 366

Chapter 12 Review Questions

Answers appear on page B4

Multiple-Choice

____ 1. Which of the following is not true about elaborative rehearsal? Elaborative rehearsal works effectively to:

a. study special terminology in literature courses.
b. interpret passages and identify organizational patterns.
c. learn factual information in science and social science textbooks.
d. reorganize and practice information in new ways.

____ 2. Understanding ways to learn procedural knowledge will help you with coursework in

a. math classes.

b. science classes.

c. composition classes.

d. all classes that include steps and processes to learn.

____ 3. Which of the following statements is not true about Bloom's Taxonomy?

a. In order to think on the higher-order levels, you must have the skills from the Remembering and Understanding levels.

b. The Evaluation Level is the highest level of thinking in both the original and the revised model.

c. In the revised version of Bloom's Taxonomy, factual, conceptual, procedural, and metacognitive knowledge are subdivisions of the Remembering Level.

d. The Synthesis Level in the original model was changed to the Creating Level in the revised model; the Knowledge Level was changed in the revised version to the Remembering Level.

____ 4. Critical thinking

a. involves gathering, understanding, and using relevant information to draw conclusions or make decisions.

b. includes the use of the Scientific Method of Inquiry.

c. involves being inquisitive, questioning what you hear or read, and using clear criteria to analyze and evaluate information.

d. involves all of the above.

____ 5. Which of the following key words are least likely to be used for questions that require you to analyze, evaluate, or create?

a. assess, classify, and convince

b. define, match, and label

c. hypothesize, interpret, and defend

d. design, recommend, and validate

Short-Answer

1. Draw and label the revised model of Bloom's Taxonomy. Next to each level, write three key words that show the types of questions or activities associated with that level.

2. Create your own definition for the term *critical thinking*. Because critical thinking involves an array of skills, many answers are possible.

Access Chapter 12 Chapter Quizzes 1-4 and Enhanced Quiz under "Interactive Quizzes" in your College Success CourseMate, accessed through *CengageBrain.com*.

Access all Chapter 12 Online Material in your College Success CourseMate, accessed through *CengageBrain.com*.